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CHEMICAL CRYSTALLOGRAPHY.—*Ammonium picrate and potassium trithionate: optical dispersion and anomalous crystal angles.* HERBERT E. MERWIN. Geophysical Laboratory.

The optical properties of these two compounds were obtained in connection with certain researches on other subjects, and are placed on record here for the benefit of other microscopists.

Ammonium Picrate.—The following observations were made on four samples variously prepared: The crystals are orthorhombic; a sample recrystallized from water consisted of thin scales || (010); a sample not recrystallized contained slender prisms elongated || ċ; one recrystallized from ammonium hydrate contained equant. grains. Measurements of two prisms corresponded satisfactorily with previous measurements.[1] Refractive indices observed microscopically were: $\alpha = 1.51_0$, $\beta = 1.87_0$, $\gamma = 1.91_0$. The orientation is $\alpha \parallel \dot{c}$, $\beta \parallel$ a, $\gamma \parallel$ b for light wave-lengths greater than 541 $\mu\mu$; and $\alpha \parallel \dot{c}$, $\beta \parallel$ b, $\gamma \parallel$ a for shorter wave-lengths. 2E for $546\mu\mu = 19°$, $578\mu\mu = 51°$, $600\mu\mu = 60°$, $635\mu\mu = 71°$, $675\mu\mu = 82°$, $528\mu\mu = 33°$, and $513\mu\mu = 45°$ to $55°$.[2]

The absorption from $700\mu\mu$ to $500\mu\mu$ is $\alpha < \beta = \gamma$. The original crystals and those recrystallized from ammonium hydrate contained streaks which for γ and β were much redder than the main parts of the crystals. The streaks were optically continuous with the rest of the crystal and showed no significant differences in refraction.

[1] See discussion and observations by H. Baumhauer, Zeits. Kryst. 49: 125. 1911.
[2] Baumhauer found for *Li* and *Na* values of 80° (about) and 56°.

From two natural prisms (110) ∧ (0$\bar{1}$0) refractive index measurements gave:

λ = 578	546	529	518+	513+	507
β' = 1.886	1.926	1.956	1.980	1.995	2.015 = γ'
α =	1.516+				

These values are in line with those of Baumhauer, and give (with the orientation and 2E) data for calculating β and γ. That is, $\beta' = \beta + 21$ to 22 per cent of $(\gamma - \beta)$. Therefore the following dispersion:

TABLE 1

DISPERSION OF AMMONIUM PICRATE

λ	α	β	γ	2V	2E
668	1.499	1.815	1.880	41°+	80°
588	1.508+	1.872	1.908	29	56
546	1.516+	1.925+	1.930	10	19
541	1.518	1.933	1.933	0	0
528	1.522	1.944	1.961	17	33
513	1.528	1.960	2.004	23–28	45–55

Baumhauer's observations on potassium picrate show that it is very like ammonium picrate. The wave-length for which it is uniaxial is evidently shorter than for the ammonium salt. It seems safe to infer that this wave-length is practically that of the helium green line 502, for which he obtained a single signal when measuring the dispersion of β and γ.

Potassium Trithionate.[3]—Blades about 1 cm. long were obtained by cooling a hot saturated solution to room temperature. The prism angles of these blades were not normal, but as follows (the dome angle was normal): 7 crystals, 10 *m* faces, 23 *l* faces, 10 *q* faces.

l ∧ *l*	39° 0′ — 39° 27′	mean =	39° 13′
m ∧ *m*	70 42 — 70 50	mean =	70 46
q ∧ *q*	45 13 — 45 39	mean =	45 31

At the base of the blades there were numerous stubby crystals, with normal angles. One of these gave the angles

l ∧ *l* = 39° 31′
m ∧ *m* = 71 3

[3] The crystals were prepared and tested by E. T. ALLEN.

A second lot of 5 crystals made from a corresponding mother liquor by evaporation at room temperature gave the following angles which are normal:

14 faces, l	$\wedge$	l	39°	20′	— 39°	40′	mean 39° 32′
5 faces, m	$\wedge$	m	71	0	— 71	15	mean 71 8
6 faces, q	$\wedge$	q	45	26	— 45	40	mean 45 30

The prisms of the rapidly-grown crystals represent thinner wedges than normal, as if the tendency toward skeletal growth parallel to the b axis had caused an actual lengthening of that axis.

The optical dispersion (α and β), of one crystal from each lot was determined from natural faces (m), and several less accurate determinations of refractive index made on crystals having good l faces. No differences of refractive index greater than ±0.001 were found. Chemical tests do not indicate any solid solution.

TABLE 2

DISPERSION OF POTASSIUM TRITHIONATE.

λ	α ±0.0001	β ±0.0001	γ ±0.002
436	1.5040	1.5805	1.621
486	(1.4993)	(1.5732)	1.612
546	1.4954	1.5673	
578	1.4941	1.5649	
589	(1.4934)	(1.5641)	1.602
656	1.4909	1.5607	
691	1.4903	1.5591	1.596

$2V_{Na}$ measured 72° ± 3°, with no noticeable dispersion. The above indices make $2V = 70° \pm 1°$.

BOTANY.—*On the origin of chicle with descriptions of two new species of Achras.* H. PITTIER, Bureau of Plant Industry.*

Many statements in cyclopedias, handbooks, and even special treatises, considered as facts, are really the expression of mere rumors collected by travellers and reproduced without the necessary discrimination.

Thus we find in almost all the literature of cacao, that this product is the crop of a tree scientifically called *Theobroma cacao*

* Published with the authorization of the Secretary of Agriculture.

L., whereas it is a fact that the larger portion of the cacao beans seen in the world market proceeds from another species, *Theobroma leiocarpa*, described fully fifty years ago by the Swiss botanist Bernouilli.[1]

The general idea is also that the Central-American rubber originates from a single species, *Castilla elastica*. In reality, as far back as 1903,[2] O. F. Cook called attention to the existence of several distinct rubber-producing species of Castilla, of which he published no less than four in 1905.[3] In 1910, the writer took up the same subject and completed to a certain extent Cook's work, with the addition of a few more species.[4] Among other things, he showed that *Castilla elastica* is a species with a very limited area in the states of Vera Cruz, Tamaulipas, and Michoacan, Central Mexico, and that most of the seeds used in building up the plantations of Ceylon and other countries in the East and West Indies and South America, proceeded from the several species scattered over Central America. Nevertheless, the notion is generally maintained that Castilla rubber is the exclusive product of *Castilla elastica*. Even the distorted name *Castilloa*, with the addition of a superfluous vowel, passes stereotypically from old publications to those of more recent date.

So far, the origin of another Tropical American product, the *chicle*, has not been questioned. It was admitted everywhere that *Achras Zapota* L., an important fruit tree known as *sapodilla* or *naseberry* in English, and in Spanish as *zapotillo*, *chicozapote*, and *níspero*, was also the only producer of this substance, which is the base of the American chewing gum and is also applied to several other uses. On the authority of travellers like Morelet and of other authors, I myself recorded that species as "abundant in the lowlands of Tabasco and Chiapas and the western part of Yucatan" (see footnote 4) as well as in Jamaica and parts of Venezuela, without ever suspecting that I was contributing to the further spreading of a fallacy.

[1] In Denkschr. Schweiz. Naturforsch. Ges. **29**: 1–15, pl. 1–7. 1869.

[2] *The culture of the Central-American rubber tree*, U. S. Dept. Agr., Bur. Pl. Ind., Bull. **49**.

[3] Science, n. ser. **18**: 438. 1903.

[4] Contr. U. S. Natl. Herb. **13**: 247–279, pls. 22–43, figs. 45–54. 1910.

My first doubts originated in Venezuela in 1917, when a friend, with a certain botanical knowledge acquired under the late Dr. Ernst, reminded me of the fact that *chicle* is one of the export products of the Orinoco Valley, adding that he had seen one of the trees from which the gum is extracted and did not believe it to be *Achras Zapota*, but perhaps a Mimusops, not unlike the *pendare*, the *purvio*, or the *masarandú*, from which the Venezuelan balata gum is obtained.

At the time, however, I gave little attention to the subject: everybody said that the chicle was obtained from the *níspero* tree and *níspero*, that is to say, Achras Zapota, it had to be. But very recently, in May of the present year, on the occasion of an official exploration of the region between the rivers Motagua and Chamelecon in Guatemala and Honduras, respectively, I came face to face with one of the so-called *nósperos*, which I could not, at first, recognize as a species of Achras. The tree, nearly one meter in diameter at the base and at least 35 meters high, was met on the first hills on the trail from Los Amates to El Paraiso, beyond La Francia, in the Molhá valley. At first sight, it had the appearance of a Mimusops, but the numerous, freshly detached corollas which covered the soil under the tree completely lacked the dorsal lobular appendages which are characteristic of this genus. Of course, this indicated a close relationship with Achras Zapota, except that the corollas were rotate or almost so, while in the latter they are tubulose; but the fact that Achras has been so long considered as a monotypic genus helped on the moment to discard the idea of its belonging to this genus.

At the time the study of the floral details could not well be pursued further, so I simply resolved to obtain more complete materials, and meanwhile started on another line of investigation. I had with me no less than six *monteros*, *i. e.*, woodsmen, some from Honduras, the others from Guatemala, and five of them had worked at the extraction of chicle. On my asking about the name of the tree, the unanimous answer was *níspero;* all agreed, too, that the fruit was edible, like that of the chicozapote; but when I asked whether this níspero and the chicozapote

were identical, the opinion was divided, one of the men explaining that there were several kinds (*varias clases*) of *nisperos*, two of which were bled for the milk. These two grew wild in the forest but the one cultivated near the houses for the fruit was never tapped, nor used as timber. Of the former two, one is met with on the valley flats and is better than the other, which always grows on hills. On my asking in what the difference consisted, I was told that the milk of the tree growing in lower exposures needed one boiling only, while the other required two. Just here, let me state that I know nothing about the technique of the raw chicle preparation, and the expedition in question was such a hurried one that I had no time to go deeper into the subject than to obtain from other persons full confirmation of the above data.

Further information tends to verify the above and to show that chicle is really the product of several species, belonging possibly to more than one genus, of the Sapotaceae. From notes taken by G. N. Collins in his expedition to Yucatan and Tabasco in 1913, it appears that there are differences in the chicle-producing trees, both in the leaf and fruit characters and in the quality of the gum. The trees growing above the 300-meter contour line, although similar in every other way to those growing at lower altitudes, do not produce latex. We have seen that in the Motagua Valley, the latex of trees on the hills is somewhat different from that of trees on the flats. Mr. Collins gives also the information that the average yield is 9 pounds per tree, and reaches up to 25 pounds. To show the importance of the product, we may add here that Mr. Collins' informant exported three million pounds of the gum during 1912.

Another tree having a floral structure identical with that found in Guatemala, and also described below, was discovered in the calcareous zone of the Chagres Valley in Panama. If we admit that both species really belong to Achras, it becomes out of the question to continue considering this genus as monotypic, and since it is now increased to three members, there is no reason why other species having so far escaped botanical collectors,

may not exist in Colombia and Venezuela, the flora of which countries is very imperfectly known.

Lastly it appears from the "Notes on Useful Plants of Mexico," published by Dr. J. N. Rose,[5] as well as from the reports of the *Comisión Catastral y de Estudio de los Recursos naturales del Estado de Sinaloa* (March, 1919), that other Sapotaceae, such as *Calocarpum mammosum* Pierre, *Bumelia Palmeri* Rose, and perhaps certain species of Lucuma, are to be included among the chicle-producing plants. Rose, however, emphasizes the importance of *Achras Zapota* as the main source of the chewing gum, though he adds also that the chicle extracted from *Calocarpum mammosum* is the best gum for masticatory purposes. According to the *Comisión Catastral de Sinaloa*, chicle is obtained there from the fruits of the *bebelamas*, which has just been mentioned under the name of *Bumelia Palmeri*. This tree was also collected in Sinaloa in 1891 by Dr. Edward Palmer, and in 1910 by Rose, Standley, and Russell, but no mention is made of its properties, further than the note by Palmer that children are very fond of the berries.

That the wood of Achras Zapota is not generally used as building material or for other purposes, mainly on account of its being very scarce, is confirmed by reports obtained by me in several Central and South American countries. This wood, being heavy, fine grained, and hard, takes a beautiful polish. But the tree is spared on account of its fruits; furthermore, it seldom reaches adequate dimensions. Although there are trees no less than 20 meters high, most of the height goes into the crown; the trunk is rather short and only about 40 cm. in diameter at most. Ernst[6] refers to its being employed in Venezuela for making barrel staves, but there are other *nísperos* in that country, and the same conclusion may have been drawn. The wood of the *níspero* (*Achras chicle*) noticed by me in the Motagua Valley is considered by the natives as incorruptible and may have been used by the Mayas for the door lintels of their monuments. In the rain forests of the Atlantic coast of Panama, I have

[5] Contr. U. S. Nat. Herb. 5: 222. 1897.

[6] La Exposicion nacional de Venezuela en 1883: p. 218. 1884.

noticed that while most fallen trees are quickly reduced to mould, the trunks of the balata-producing Mimusops, called also *níspero*, would lie almost indefinitely, keeping in perfect condition.

From what has been explained so far, the following conclusions can be drawn:

1. The *nísperos* of Central and South America include several species of Achras, Mimusops, and other genera of the Sapotaceae, so that the name does not necessarily correspond to *Achras Zapota*.

2. The chicle of commerce is not extracted exclusively, if at all, from the latter species, but mainly from other trees with the same vernacular name.

3. The famous door lintels of the ruins of Yucatan were not made from the wood of *Achras Zapota*, but more likely from one of the other *nísperos* in the region.

4. The neotropical genus *Achras* is not monotypic. Besides *A. Zapota* L., it includes up to the present, two more Central American species, and others may come to light when the flora of northern South America is thoroughly listed.

5. Considering the importance of the product, a further, careful investigation of the facts, *in loco*, that is to say, in the valleys of the Motagua and Rio Dulce, in Peten, Yucatan, and Tabasco, is necessary, and should cover the months of April, May and June, so that specimens in flower and fruit, as well as wood samples, could be procured.

Following are the descriptions of the two new species of Achras:

Achras Chicle Pittier, sp. nov.

A large, deciduous laticiferous tree, reaching a height of 25 m. and over, with a basal diameter of 50 cm. and over, the trunk straight, with a rugose or scaly bark, the crown high and elongate, the branchlets thick and glabrous.

Leaves alternate, petiolate, coriaceous, congested on the new growth at the end of the branchlets; petioles subterete, narrowly canaliculate, puberulent, 2.5 to 3 cm. long; leaf-blades obovate-elliptic, long-cuneate at the base, subacute at the apex, 12 to 20 cm. long, 4 to 7 cm. broad, glabrous, dark green and dull above, light green and almost glaucescent beneath; costa impressed above, very prominent beneath, the primary veins numerous, parallel, inconspicuous. Stipules not seen.

Flowers very numerous, congested at the end of the branchlets, the pedicels 1.4 to 1.8 cm. long, puberulous; sepals 6 (3 + 3), those of the

outer whorl imbricate, ovate, slightly connate at the base, rounded at the apex, grayish pubescent without, glabrous and purplish within, about 7 mm. long and 3.5 mm. broad, those of the inner whorl valvate, oblong, obtuse at the apex, densely grayish pubescent without, purplish and glabrous within, 7 mm. long and 2.5 to 3 mm. broad; corolla rotate, 6-lobulate, glabrous, white, the tubular part 1.5 mm. long, the lobes exappendiculate, ovate-lanceolate, obtuse, about 6 mm. long and 4 mm. broad; stamens and staminodes connate at the base, inserted at the same height, 2 to 2.5 mm. from the base of the corolla, the former slightly exserted, the filaments terete, attenuate, about 5 mm. long, the anthers extrorse, dorsifixed ovate or ovate-lanceolate, cordate at the base, obtuse, about 3 mm. long; staminodes petaloid, ovate-acuminate, broad at the base, subacute, about 4.5 mm. long, irregularly toothed or laciniate; pistil 8 to 8.5 mm. long, substipitate, the ovary globose-depressed, deeply sulcate, minutely fulvo-pubescent, about 1 mm. high, 2 mm. in diameter, 7-, 8- or 9-celled, the cells uniovulate; style slender, slightly attenuate, about 7 mm. long, adpressed, hairy at the base, glabrous higher, the apical stigmatic surface papillose, minutely tuberculate.

Fruit globose-depressed, about 3.5 cm. long and 4 cm. in diameter, the pedicel thick, about 2 cm. long. Skin brown-ferruginous, almost smooth; mesocarp and dissepiments fleshy, succulent, with 4 to 6 seeds, more or less. Seeds large, compressed, ovate, slightly curved, brownish and dull, 2.3 cm. long, 1.4 to 1.7 cm. broad, 6 to 7 mm. thick, the margin smooth, slightly thickened, with a small, narrow, inconspicuous cicatricula.

Type in the U. S. National Herbarium, collected in flower at Vega Grande near Los Amates, Department Izabel, Guatemala, at about 200 meters above sea-level, May, 1919, by H. Pittier (no. 8537).

At first sight, this species reminds one of the Mimusops of the *manilkara* group, an impression that is not sustained by a closer examination of the corolla, in which the absence of dorsal appendages is instantly noticed. This detail, added to the presence of six petaloid staminodes, places this species among the Sideroxyleae rather than among the Mimusopeae. Furthermore, the genus Achras seems to be indicated by the hexamerous floral envelopes and androceum. But the corolla is plainly rotate, with a very short tube (almost 4 times shorter than the lobes) and not urceolate with the tube half as long as the lobes; the margin of the lobes is entire and not sinuate, the design of the staminodes is quite distinct, the stamens and style are exserted, and the ovary cells do not seem ever to be more than 9. If the dorsal appendages of theCorolla were present, we would have a perfect Mimusops, without them, but with the sepals distinctly biseriate, the corolla tube very short, the ovary cells at the most 9, I felt reluctant at first to place the tree under Achras. On the other hand, the fruit

and other characters indicate such a close relationship that I am confident the decision to place the species in this genus will be supported by further study. It seems preferable to introduce a few slight modifications in the generic definition rather than to create a new division in the already oversplit and somewhat confused order Sapotaceae.

Achras calcicola Pittier sp. nov.

A deciduous, laticiferous tree, 15 to 25 meters high, often over 1 meter in diameter at the base, the trunk usually straight, covered with a 2 cm. thick, rimose bark, the crown reduced, depressed, the branching divaricate; latex white; wood hard, reddish.

Leaves alternate, petiolate, congested at the end of the branchlets, coriaceous, entirely glabrous; petioles terete, canaliculate, 2 to 3 cm. long; leaf-blades obovate-oblong, cuneate-attenuate at the base, shortly obtuse-acuminate at the apex, 8 to 18 cm. long, 3 to 6 cm. broad, dark green and dull above, pale green beneath, the costa impressed on the upper face, prominent beneath, the primary veins numerous and inconspicuous.

Flowers numerous, pedicellate, congested at the base of the leaves at the end of the branchlets; pedicels more or less pubescent, about 1 cm. long; sepals 6 (3 + 3), ovate or ovate-oblong, attenuate toward the apex, the exterior ones 5.5 mm. long, 3.5 to 4 mm. broad, densely fuzzy-pubescent without, the interior ones a little longer and narrower, pubescent at the apex, ciliate on the margin; corolla white, broad campanulate or almost rotate, glabrous, 6-lobulate, the tubular part 1 mm. long, the lobes ovate-acute, 3.5 to 4 mm. long, imbricate, sometimes denticulate on the margin, exappendiculate; stamens and staminodes 6, connate at the base, inserted at the apex of the tube; stamens as long as the corolla lobes, the filaments terete, apiculate, about 2.5 mm. long, the anthers extrorse, dorsifixed, emarginate at the base, obtuse, about 3 mm. long; staminodes petaloid, ovate, bifid, about 4 mm. long, the margin irregularly denticulate; pistil 4.5 to 5 mm. long, the ovary globose-depressed, more or less distinctly sulcate, 9-celled, stiff-hairy; style obtuse, glabrous. Fruit not known.

Type in the U. S. National Herbarium, no. 678503, collected in flower, in the dry forests on Eocene limestone around Alhajuela, Chagres Valley, Panama, May, 1911, by H. Pittier (no. 3457).

This species differs from *Achras Zapota* L. in the acuminate leaves, the smaller flowers, the broadly open corolla with short tube, the insertion, size, and shape of the stamens, and the 9-celled ovary. It shows more affinities with *Achras Chicle*, just described, but has smaller flowers, the parts of which also differ in shape and size.

ABSTRACTS

Authors of scientific papers are requested to see that abstracts, preferably prepared and signed by themselves, are forwarded promptly to the editors. The abstracts should conform in length and general style to those appearing in this issue.

GEOLOGY.—*The oil fields of Allen County, Kentucky.* EUGENE WESLEY SHAW and KIRTLEY F. MATHER. U. S. Geol. Survey Bull. **688.** Pp. 120, pls. 36, figs. 10. 1919.

This report is designed to be purely geologic in nature, and the reconnaissance field work included the determination of the general lay of the rocks and details of structure in certain areas. The dips are generally too low to be read by the clinometer. Few of the beds of this region can be followed any considerable distance, though by means of fossils the stratigraphic position of beds outcropping many miles apart can be determined within a few feet. As the oil sand lies not more than 200 feet below the valley bottoms, most of the drilling is done with machines. There is no forrest of derricks but instead inconspicuous pumping jacks scattered through the woods and fields of a somewhat hilly region.

The stratigraphy is described in detail. The pay sands occur in the "Corniferous" limestone of Devonian age and the Silurian lime-stone. The capacity and life of wells, and the origin, source, and mode of accumulation of the oil are discussed, favorable structures are shown and suitable locations for drilling are suggested. Circumstantial evidence points to the derivation of the oil from plant remains, particularly spore cases of ferns and related plants. R. W. STONE.

GEOLOGY.—*The Kantishna Region, Alaska.* STEPHEN R. CAPPS. U. S. Geol. Survey. Bull. **687.** Pp. 112, pls. 17, figs. 6. 1919.

The Kantishna region lies between Fairbanks and Mt. McKinley and west of the railroad from Seward to Fairbanks. The area described includes about 4500 square miles. Geologic reconnaissance shows four pre-Tertiary formations—Birch Creek schist, the Tatina and Tonzano groups, and the Totatlanika schist. In none of these rocks

have fossils been found, and their differentiation and correlation is based largely on lithologic and stratigraphic grounds. Younger formations consist of sands and gravels, shales, lignitic beds of Tertiary age and a great abundance and variety of Quaternary deposits. The productive gold placer deposits of the district are all in the basins of the streams that head in the Kantishna Hills. A large part of the gold of the stream placer gravels was derived by erosion from the fissure quartz veins that cut the Birch Creek schist. The veins which carry gold, silver, and antimony have been prospected but the inaccessibility of the region has prevented their development. R. W. STONE.

GEOLOGY.—*Some American cretaceous fish scales.* T. D. A. COCKERELL. U. S. Geol. Survey Prof. Paper **120–I**. Pp. 165–202, pl. 7. 1919.

Fish remains are extremely abundant in several Cretaceous formations of the Rocky Mountains and Great Plains, but except in the Niobrara formation of Kansas, a fish skeleton well enough preserved for description or identification is the greatest rarity. In the original descriptions of both the Mowry and the Aspen shales of Wyoming the presence of fish scales is mentioned as a characteristic feature.

Descriptions of scales without figures are unsatisfactory, especially if they are to be largely used by stratigraphers who have no intimate knowledge of lepidology. Consequently it has been considered necessary to illustrate this paper fully, with enlarged figures, from photographs.

This discussion deals almost entirely with a marine fauna. So far as known at present the Tertiary fishes mark a considerable advance on or at least change from their Cretaceous predecessors. It ought to be possible as a rule to distinguish a Cretaceous from a Tertiary deposit by means of a single well-preserved fish scale. The exceptions will be found in those groups which range with little change from the Cretaceous to the present day—the berycoids, clupeids, or hemiramphids. Just as the Tertiary fishes mark an advance on the Mesozoic, so also the later Cretaceous fishes present evidence of evolution and modernization. This statement applies not only to the Upper as contrasted with the Lower Cretaceous, but also, and rather markedly, to the Montana group as contrasted with the Colorado group. Thus evidence is found of a rather slow and gradual modernization of the fish fauna, the breaks in the series corresponding with the geologic breaks and not being attributable to any extraordinary migrations or sudden new develop-

ments. Scales of fishes from the Chico, cut off from the inland sea by the western uplands, are all different from those in Rocky Mountain deposits. The Chico has a veritable clupeid, but so far no genuine clupeids have been found in the Benton, Niobrara, Pierre, or Fox Hills. The inland waters seem to have lacked berycoids, which are so characteristic of the European strata. R. W. STONE.

GEOLOGY.—*Structure and oil resources of the Simi Valley, Southern California.* W. S. W. KEW. U. S. Geol. Survey Bull. 691-M. Pp. 323–347, pl. 4, fig. 1. 1919.

This report describes a small oil field about 32 miles northwest of Los Angeles, in the Simi Valley, Ventura County. All the rocks within the Simi Valley district are of sedimentary origin with the exception of a few small areas of basic igneous rocks of Miocene age. The greater part of the Simi Hills is composed of rocks of Chico (Upper Cretaceous) age. In the Simi Valley district, as in other localities in California, the Eocene comprises both the Martinez (lower Eocene) and the Tejon (upper Eocene) formations. Although these divisions are elsewhere separated by an unconformity, the series, consisting of 3,500 to 6,500 feet of conglomerates, sandstones, and shales of various types, here appears to be homogeneous.

The Monterey group (Miocene), which in the Simi Valley district is divided into the Vaqueros sandstone and Modelo formation, is one of the most widespread series of rocks in California. The Fernando formation is exposed in a series of irregular areas along a synclinal region between the Santa Susana Mountains and the Simi and San Fernando valleys. It lies with a marked unconformity on all the older formations.

The structure, or attitude of the different strata in the Santa Susana Mountains and Simi Valley is closely related to that of the California Coast Range, which is characterized by a number of northwestward-trending folds, broken by faulting. The Simi Valley oil district lies in the midst of the westward-trending ridges of the Coast Ranges and embraces a part of two large structural features, the Santa Susana Mountains and the Simi Hills. In this region the dominant structure is a result of compressive forces which acted from north to south at the end of the Pliocene epoch. The principal structural feature in the Simi district is the Santa Susana fault which follows closely the foot of the steep southern front of the Santa Susana Mountains. The Simi anticline is economically the most important structural feature

in the Simi region at the present time on account of its association with the Simi oil field.

As the object of this paper is to make recommendations bearing on both developed and possible new territory in the Simi Valley, the conditions under which the oil occurs in the field situated on the flanks of the Santa Susana Mountains and Oak Ridge are briefly reviewed. The more productive wells according to the records appear to be either along the axis of the anticline or immediately north of it.

R. W. STONE.

GEOLOGY.—*Anticlines in a part of the Musselshell Valley.* C. F. BOWEN. U. S. Geol. Survey Bull. 691-F. Pp. 185–209, pl. 1. 1918.

Previous investigations had shown that the Musselshell Valley, Montana, is an area in which the rocks have undergone considerable folding. The work has demonstrated the existence within the area studied of several well-developed anticlines and domes, which seem to offer structurally favorable places for the accumulation of oil and gas. The demonstration of the presence or absence of commercial accumulations of these fluids in the folds has been less conclusive, owing largely to the undeveloped condition of the area.

Sandstones that would serve as suitable reservoirs for the accumulation of oil occur at several horizons. (1) Near the top of the Colorado shale there is a transition zone of thin sandstones and sandy shale beds. (2) About 1200 feet below the top of the Colorado. (3) About 250 to 300 feet lower in the section is another sandstone of similar character, but much thinner and more distinctly conglomeratic. (4) Associated with and underlying the Mowry shale member, in the eastern part of the field, are several thin, finely conglomeratic sandstones. (5) At the top of the Kootenai there is 40 to 50 feet of platy, rather fine grained sandstone in approximately the same position as the Greybull sand of the Big Horn Basin, Wyoming. (6) Near the base of the Kootenai there is another coarse, porous sandstone of undetermined thickness.

The Eagle sandstone is not a likely source of oil or gas in most of this area, for it has been removed from the crests of most of the anticlines, and thus any oil or gas that may have originally been stored in it has had an opportunity to escape.

This report discusses the geology of the region as a whole, and also suggests the most favorable places for future development.

R. W. STONE.

GEOLOGY.—*Oil and gas geology of the Birch Creek-Sun River area, Northwestern Montana.* EUGENE STEBINGER. U. S. Geol. Survey Bull. 691-E. Pp. 149–184, pl. 1, figs. 3. 1918.

The purpose of this paper is limited to a presentation of the field evidence having a bearing on the oil and gas prospects of the area, including a description of the broader features of the geology and more detailed accounts of local structural features that seemed to be possible sources of oil and gas.

All the formations in the Birch Creek-Sun River area are of sedimentary origin. Exclusive of the surficial rocks the formations present range in age from Carboniferous to probably lower Tertiary. Oil and gas possibilities of promise seem to be confined to the Cretaceous rocks. Earth stresses of intensity great enough to fold and tilt the rocks appreciably from their originally horizontal attitude were developed in this region during Paleozoic or later time only after the end of the Cretaceous period.

Summary descriptions of the geologic formations, arranged in their proper sequence, are given.

It is believed that the sandstones in at least the upper part of the Kootenai formation, closely associated with the overlying petroliferous rocks in the lower part of the Colorado, offer a possibility of being productive of oil or gas. The Colorado shale seems to be of first importance as a possible source of oil and gas in northwestern Montana and according to present information is the only promising source known. In the area here discussed the lower part of this shale was found to be petroliferous in every extensive exposure in a belt extending about 35 miles from north to south across the area between Deep Creek and Sun River. It contains bituminous shale, which yields oil on distillation, and soft maltha or natural tar in crevices of fractured limestone, which very probably is a residuum from the evaporation of petroleum. The evidence seems fairly conclusive that this shale offers a source for petroleum that may have accumulated in commercially valuable quantities either in the Colorado or in the sandy portions of the Kootenai and Virgelle sandstone in immediate contact with it.

The area described in this report can be readily divided into two large structural units which differ greatly in the degree to which the strata have been deformed. A slightly curving line, in general parallel to the mountain front, extending northward a distance of nearly 60 miles, would mark a sharp transition from an area on the east in which the

beds are nearly horizontal to an area on the west in which the rocks have been severely compressed into folds and broken by faulting.

In the area of nearly horizontal rocks there are six large anticlines whose structure is probably continuous in depth far enough to form traps in sands in the Virgelle, Colorado, and Kootenai formations. The belt of disturbed rocks in the Cretaceous and Tertiary (?) formations adjacent to the mountains in the Birch Creek-Sun River area is a small part of a large structural province that extends northward far beyond the Canadian boundary into Alberta, a distance exceeding 200 miles, and southward to the valley of Dearborn River.

R. W. STONE.

ENGINEERING.—*Physical and chemical tests on the commercial marbles of the United States.* D. W. KESSLER. Bur. Stand. Tech. Paper No. 123. Pp. 54, pls. 7. 1919.

This paper is the first report of the Bureau of Standards in connection with an extensive cooperative program for investigating the building stones of the United States. The other government departments participating in the work on different phases of this investigation are the U. S. Geological Survey, Bureau of Mines and Bureau of Public Roads.

This paper comprises the results of strength tests, water absorption, porosity, specific gravity, freezing, thermal expansion, electrical conductivity and chemical tests on 52 different types of marbles produced in this country. The purpose of the work is to determine the relative value of the different types for building purposes and other special uses.

Compressive strength tests were made on specimens in the original condition and on specimens after being soaked in water for two weeks. The strength of the dry specimens gave values ranging from 7850 to 50205 lbs. per sq. in. As a rule the soaked specimens gave lower compressive strengths than the dry, and in a few cases the loss due to soaking was over 25 per cent.

Transverse and tensile strength tests are included and show the strength of the specimens when broken perpendicular and parallel to the bedding planes.

The freezing tests made for this report consisted in determining the loss in weight and strength due to 30 freezings and thawings. While these losses were considerable in most cases, some samples showed practically no loss and occasionally a gain in strength was indicated.

Hence it was decided that 30 freezings are not enough to give a trustworthy indication of the durability of such materials. An apparatus has been installed which automatically shifts the specimens back and forth between a cold chamber and warm chamber at certain intervals. With the use of this apparatus, it is possible to make a great number of freezings which will correspond to several years of exposure to the weather. It is proposed to make extensive weathering tests with this apparatus to determine more definitely the relative effect of frost action on the different marbles as well as other types of building stones.

Electrical resistivity tests were made on a number of different types to determine their relative value as insulators and resistivity under different conditions of moisture. The results show a considerable range of values indicating that there is a choice of marble for use in switch boards and allied purposes.

Measurements of the thermal expansion made on a few samples of marble in this investigation show that this material does not expand at a uniform rate even at ordinary temperatures. As the temperature is increased the rate of expansion increases, hence it is not possible to state a coefficient of expansion for marble that will hold good for any very great range of temperatures. Another peculiarity brought out by these tests was the fact that marble when expanded by heating does not contract to its original dimensions as the temperature is lowered, but retains a part of the increase permanently. A number of successive heatings show the same effect, each adding an increment of length to the specimen.

A few cases of warped marble slabs are illustrated and a discussion is given of the causes which may be instrumental in bringing about this warping.

METALLURGY.—*Aluminum and its light alloys.* Bur. Stand. Cir. No. 76. Pp. 120. 1919.

This circular attempts to give all available information concerning the physical and mechanical properties of aluminum and its light alloys in summarized form. Commercial alloys are described and compared. The corrosion and disintegration of aluminum and its alloys are considered.

The endeavor has been made to reproduce only such data as have passed critical scrutiny. Wherever possible, data and information have been put into the form of tables and curves. A complete bibliography and specifications for aluminum and its light alloys are given.

J. F. MEYER.

METALLURGY.—*The effect of rate of temperature change on the transformations in an alloy steel.* H. Scott. Bur. Stand. Sci. Paper No. **335.** Pp. 91–100, figs. 7. 1919.

Cooling curves taken on an air-hardening steel of the high speed tool steel type show two critical points on cooling from 920° C, one occurring at about 750° C. accompanied by the precipitation of the hardening constituent, the carbide, and the other on fast cooling at about 400° C. under which condition the carbide remains in solution as martensite. On cooling at intermediate rates both transformations are observed and the constituents, troostite and martensite, are detected by the microscope. A transformation is observed on the heating curves taken following a fast cooling which is manifested by an evolution of heat ending at about 645° C. and which represents the precipitation of the carbide held in solution by previous rapid cooling. The resolution of the carbide under these conditions occurs at a temperature some 10 to 15° C. higher than after a slow cooling.

The conclusions drawn support the twenty-year-old theory of Le Chatelier that martensite is a solid solution of carbide in alpha iron.

H. S.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

PHILOSOPHICAL SOCIETY OF WASHINGTON

818TH MEETING

The 818th meeting was held at the Cosmos Club, April 12, 1919, President HUMPHREYS in the chair; 58 persons present. The minutes of the 817th meeting were read in abstract and approved.

The first paper was presented by Mr. WM. BOWIE on *Mapping the United States for military and civil needs*. This paper was illustrated by lantern slides.

The speaker covered the general phases of map making in the United States and showed the steps that were taken in making the surveys and the resulting map, in any area in which no control or maps existed. No details were given in regard to the technical questions involved, although there are many of great interest in connection with the work in the field, in the drafting room, and in the map reproduction plant.

There are many uses to which maps can be put and, in general, there is a map for each of the special uses. Some of the maps are very detailed in character, showing the natural as well as the cultural features and giving accurate contours to show the elevations and configuration of the ground.

It was said by the speaker that about 40 per cent of the United States has been topographically surveyed but that some of this area will have to be resurveyed on account of the improvement in methods and the more exacting demands of map users.

The question before the mapping bureaus to-day is the task involved in making accurate contoured maps over the remaining 60 per cent of the area of the country. Before this can be done efficiently, precise leveling and primary triangulation must be carried into much of the unmapped area. The early completion of the map of the United States would be of great military and civil benefit, as accurate maps are essential from a military standpoint in the defense of the country, and from a civil standpoint it is necessary to have them for the efficient development of industries and commerce.

The speaker said that very accurate maps of large scale should be made along the coasts of the United States for purposes of defense in case of invasion. The war has proved that troops cannot operate effectively without very accurate maps on which a great amount of military detail connected with the movement of troops may be shown. For artillery purposes the maps must be exceedingly accurate, in order that long range firing may be effective.

The speaker discussed the question of whether accurate maps can be made from aeroplanes and expressed the opinion that undoubtedly aeroplane photographs can be used in the revision of existing maps. In many cases where the country is practically flat, aeroplane photographs may be used for original surveys. It is probable that difficulty would be experienced in making contour maps from aeroplane photographs. This would be due to the difficulty of having the camera in a vertical position at the time the photograph was taken and on account of the condition which would make it impossible to do accurate contouring when the contour interval is small. Undoubtedly the aeroplane will have considerable use in surveying and at present several of the government organizations engaged in mapping are investigating the subject of surveying from aeroplanes.

Discussion.—Capt. ELLIS spoke of the German and French maps of eastern France. Mr. J. F. HAYFORD discussed the possibilities of mapping from aeroplane photographs. Mr. G. K. BURGESS spoke of the work of the French in constructing maps for Algeria and Morocco from aerial photographs.

The second paper was by Mr. OSCAR S. ADAMS on *A study of map projections in general* and was also illustrated by lantern slides.

The difficulty encountered in map construction arises from the fact that the earth's surface is ellipsoidal in shape and is consequently non-developable, that is, it cannot be spread out in a plane without some stretching, some tearing, or some folding. The determination of a projection consists in fixing upon some system of lines in the plane that will represent the meridians and parallels upon the earth. An orderly arrangement of these lines, such as to give a one-to-one correspondence between the points on the earth and those upon the plane, is generally expressed in terms of some mathematical formula, and in fact all projections in use can be so stated.

In studying projections there are four main things to be considered. These four considerations are:

(1) The accuracy with which a projection represents the scale along the meridians and parallels.

(2) The accuracy with which it represents areas.

(3) The accuracy with which it represents the shape of the features of the area in question.

(4) The ease with which the projection can be constructed.

The scale of a map in any given direction at any point is the ratio which a short distance measured upon the map bears to the corresponding distance upon the surface of the earth.

The subject of map projections is generally treated under the following subdivisions:

(a) Perspective or geometrical projections. (b) Conical projections. (c) Equivalent or equal area projections. (d) Conformal projections. (e) Azimuthal or zenithal projections.

These classes are not, however, mutually exclusive since a given projection may belong to two or sometimes three of the classes.

The subject of map projections is a very wide one and some of the considerations have their roots extending far into the fertile soil of pure mathematics. A careful working out of the results for any one projection forms a good exercise in the practical application of mathematical knowledge.

Discussion.—This paper was discussed by Messrs. SOSMAN and WM. BOWIE.

Adjournment took place at 9.53 P.M. and was followed by a social hour.

819TH MEETING

The 819th meeting was held at the Cosmos Club, May 10, 1919, President HUMPHREYS in the chair; 40 persons present.

The minutes of the 818th meeting were read in abstract and approved. The first paper was presented by Mr. F. J. SCHLINK *On the nature of the inherent variability of measuring instruments.*

This paper treats of those characteristics of the performance of an indicating measuring instrument, on account of which the instrument fails to give identical readings for repeated applications of the same value of the quantity being measured. Variable errors introduce serious difficulties, and the obtaining of a high degree of freedom from variability in instrument operation, although it has not until very recently been given any general or systematic consideration, is likely to be very much more important than mere smallness of calibration error. A means of defining the variability of measuring instruments, either indicating or integrating, with respect to random observations in calibration, is illustrated, in which the characteristics of the instrument, as regards dispersion of readings, are set forth by reference to the surface defined by a family of probability curves.

The concepts of resilience and the cyclic state with respect to instrument operation are next introduced and it is shown by experimental results on a typical indicating instrument of considerable mechanical complexity that when once cyclic or regularized operation is set up, the indications lie upon a hysteresis loop which, while defining a zone of uncertainty or variance, is in itself definite and reproducible with high precision, provided that the successive increments of the independent variable are applied aperiodically and in the absence of jarring or vibration, in such manner as to avoid all overshooting of the final reading. This method is directly applicable only in the absence of appreciable transient after-effects in the operation of the instrument.

The causes of instrumental hysteresis may be either elastic or mechanistic; the nature and effect of the latter are illustrated and explained. The type of calibration that would obtain in the absence of friction has been determined by the study of instruments subjected to vigorous jarring and the relation between cyclic and acyclic calibration was thus made evident. An experiment was shown using a crude type of automatic weighing scale which served to demonstrate the determinate nature of the hysteretic lag in the unvibrated, aperiodic condition of

operation, as well as the influence of jarring upon the nature and amount of the lag.

The paper was illustrated by lantern slides.

The paper was discussed by Messrs. C. A. BRIGGS and W. P. WHITE.

The second paper was presented by Mr. R. L. SANFORD on *Magnetic analysis.*

This paper gives a definition of magnetic analysis and briefly discusses the scope of the subject.

It points out that a method which makes possible the testing of steel and steel products without in any way injuring the product gives promise of having very great commercial value.

The very strict correspondence between the magnetic and mechanical properties may serve as the basis for such a non-destructive method of inspecting steel products by comparison with tested samples which thus constitute standards of quality.

The proper interpretation of the results of magnetic analysis requires a full and complete knowledge of the correlations existing between magnetic and other properties of steel. Much remains to be done along this line.

A number of applications of magnetic analysis that give promise of practical value are described. Each type of problem requires an individual solution and there are many types of problems.

It is not by any means to be claimed that magnetic analysis will displace any of the present well established methods of metallography. On the other hand, it bids fair to develop into a powerful tool in the hands of the investigator as well as a rapid and accurate means for the testing of steel and steel products.

The paper was illustrated by lantern slides.

Discussion.—This paper was discussed by Messrs. WHITE, SOSMAN, C. A. BRIGGS, DICKINSON, CRITTENDEN, HERSCHEL, and AGNEW.

Adjournment took place at 9.50 P.M. and was followed by a social hour.

S. J. MAUCHLY, *Recording Secretary.*

GEOLOGICAL SOCIETY OF WASHINGTON

336TH MEETING

The 336th meeting was held at the Cosmos Club, Wednesday evening, May 7, 1919, President ULRICH presiding, and 173 persons present.

ALFRED H. BROOKS: *Some geologic problems relating to the war in Europe.*

At the outbreak of the war no provision had been made for the use of geologists in any of the belligerent armies. So far as known the British Expeditionary Force was the first to employ geologic officers in determining water supply, and the Germans the first to recognize the need of geologic knowledge in military mining. In the latter field the British soon followed, and under the leadership of Lt. Col. T. EDGEWORTH DAVID carried the geologic work to a much higher degree of refinement than did any of the other armies. Geologic staffs were organized in both the British and German armies early in 1916, and probably at about the same time geology was given some recognition in the Austrian Army. A geologic section was established in the American Expeditionary Force in September, 1917. There were no geologic officers in the French Army during the entire war, though some of the French engineers made use of the science.

The principal applications of geology to military problems are as follows:

(1) The determination of water resources, both underground and surface, at the front and along the line of communication.

(2) The determination of the physical character of soil, subsoil, and bedrock and the presence or absence of underground water with relation to their effect on field works, including trenches, dugouts, and mines.

(3) The distribution, occurrence, and quantity of road metal, ballast, and material for concrete.

(4) The determination of the physical character of soil, and subsoil during wet and dry seasons, with relation to its influence on the movement of large bodies of troops and of artillery and tanks.

Practically all uses of geology fall within the above general classification. It is evident that any engineering project involving extensive excavation may call for geologic knowledge. It is evident too that the sanitation of camps and cantonments must take cognizance of the underground drainage conditions as well as of water supply and surface formations. It has been found that certain geologic conditions by furnishing good electric transmission favor the use of the listening devices which were extensively used during the period of trench warfare. It should be added that one of the important uses of geology in the

American Expeditionary Force was the forecasting of the physical conditions within the enemy's lines.

337TH MEETING

The 337th meeting was held at the Cosmos Club on Wednesday evening, May 14, 1919, President ULRICH presiding, and 58 persons present.

Capt. CHARLES H. LEE: *Experiences in supplying water to our army at the front.*

Drainage areas and general geology with special reference to pervious and impervious rocks were described. The rivers are widely distributed and in many areas springs are a very valuable source of water supply, especially in Northeastern France where the American Expeditionary Force was engaged. The most important are contact springs between limestone and shale. The Paris Basin is an artesian basin, the water being in greensand formations. Illustrations were shown of the various methods used by the engineers to supply the troops with water, including the construction of dams and concrete and wooden tanks, and the transportation of water both by pipe lines, automobile trucks, wagons, and, lastly, by small tanks on men's backs delivered directly to the men in the trenches.

KIRK BRYAN: *Habits of thought of a geologist applied to military problems.*

The speaker related his experience as a private in the Intelligence Section (G-2) of the 5th Army Corps, First American Army, during the St. Mihiel and Argonne-Meuse operations extending from September 12 to November 11, 1918. He referred to the demand for geologic and physiographic information in active military operations and showed examples of such work done under the disadvantageous conditions of war. He pointed out that geologists have a mental limitation which compels them to think along professional lines; they should on this account be placed in such position in an army that this habit of thought will be most useful. One of these places is in the Intelligence Section where studies of the terrane are required and can be most readily circulated.

These studies will be of two types: (1) general papers referring to large areas in the theater of war and sent out from Army Headquarters from time to time; (2) special local reports of enemy defensive areas or of the zone of advance sent out from Army Corps Headquarters immediately previous to an attack. These descriptions should be skilfully prepared on the basis of a genetic study of the physiography but without technical language and accompanied by diagrams, profiles, sketches and, when available, photographs. The object of the reports is to stimulate the imagination and assist in the visualization of the enemy country. Over this country troops must advance and it is too much to expect that the officers of the time, largely drawn from civilian life, should be adepts at the difficult art of visualization from maps. For, however good the maps, visualization is a difficult mental

process even for trained men and accurate skilfully written descriptions are a great aid.

ADOLPH KNOPF: *Present tendencies in geology: metalliferous deposits.* The chief problems and tendencies at the present time in the study of ore deposits are: (1) the reaction against undue dependence on the microscope, whether it be the petrographic or the metallographic microscope; (2) the determination of the influence of pressure and temperature in producing the mineral facies of ore deposits, and as a corollary, the zonal distribution of ore deposits around intrusive centers; (3) the application of physical chemistry to the problems of ore deposition; (4) the reaction against the extreme acceptance of the doctrine of the origin of ore deposits from magmatic waters; (5) the application of physiography to economic geology, especially with reference to the origin of gold, iron, manganese, and nickel deposits as related to the development of peneplains; (6) the bringing of economic geology into closer touch with economics and with the larger social policies of the State; (7) the taking of inventories of the world's chief mineral resources; and (8) the estimation of mineral reserves by improved methods, especially by applying the modern methods of statistical analysis. The war and the problems arising from the war as to the international adjustment of mineral supplies have particularly emphasized the need for detailed information on the world's mineral resources, especially for information of a quantitative character.

RALPH W. STONE, *Secretary.*

SCIENTIFIC NOTES AND NEWS

MATTERS OF SCIENTIFIC INTEREST IN CONGRESS

Since the last report in this JOURNAL[1] Mr. BACHARACH'S bill (H. R. 7785) has been passed by the House of Representatives, and is now in the hands of the Senate Committee on Finance.

The bill as now drawn provides an increase of 15 per cent in the existing duty on chemical glassware, 10 per cent on porcelain ware, 25 per cent on scientific instruments, 40 per cent on surgical and dental instruments; removes optical glass from the free list and places thereon a duty of 45 per cent; and repeals the existing "duty-free provision." It was debated in the House (in session as Committee of the Whole) on August 1 and 2. Mr. Bacharach presented the principal arguments for the bill, emphasizing not only the "revenue," "infant industry," and "cheap foreign labor" arguments which support all protective tariff bills, but also the "key industry" and "foreign propaganda" arguments, which are comparatively new in American tariff discussion. The latter two arguments were scarcely referred to again during the debate. The strongest future foreign competition, according to Mr. Bacharach, is expected to come from Japan, not from Germany. Mr. MOORE, of Ohio, also supported the bill on behalf of glass and porcelain manufacturers in his district. Mr. GRIFFIN, of New York, opposed the bill, asserting that it was "the opening gun in the battle for a general increase of the tariff." Mr. KITCHIN, of North Carolina, also opposed it, arguing in favor of a licensing system instead of a protective tariff. The rest of the debate was essentially political. An amendment to insert "watch crystals, 60 per cent ad valorem" went out on the point of order that the bill related only to chemical and laboratory glassware. Three Democratic amendments to restore existing rates were defeated; likewise an amendment to retain the duty-free provision, in supporting which Mr. Kitchin asserted that the repeal of the duty-free clause would tax college students $900,000 yearly for the benefit of the manufacturers. The division on this amendment, as pointed out by Mr. Kitchin, was on strictly party lines.

Mr. TAYLOR, of Colorado, introduced, on August 14, H. R. 8441: "Authorizing the Secretary of the Interior to make investigations, through the Bureau of Mines, of oil shale to determine the practicability of its utilization as a commercial product." Referred to the Committee on Appropriations. A similar bill was introduced in the Senate on August 4 by Mr. KING (S. 2722).

Mr. FRANCE, of Maryland, has introduced in the Senate a resolu-

[1] This JOURNAL 9: 421. 1919.

tion (S. J. Res. 91) "conveying the thanks of Congress to Dr. JAMES HARRIS ROGERS, of Hyattsville, Maryland, the discoverer of underground and underwater radio." An appropriation of $1,000 is provided for a suitable gold medal. Referred to the Committee on Naval Affairs.

A message from the President on August 21 (H. Doc. 197) transmitted an invitation from the Government of the French Republic to that of the United States to send delegates to a proposed conference at Paris on September 30, 1919, "to consider questions relating to the reorganization of the service of the exchange of meteorological information," with a recommendation from the Secretary of Agriculture that appropriation be made for two delegates to the conference. Referred to the Committee on Appropriations of the Senate, and the Committee on Agriculture of the House.

Hearings have been completed on the Patent Office reform bills.

NOTES

An Agricultural History Society has been organized in Washington "to stimulate interest, promote study and facilitate publication of researches in agricultural history." The officers are: *President*, RODNEY H. TRUE, of the Bureau of Plant Industry; *Vice-President*, WM. J. TRIMBLE, of the North Dakota Agricultural College; *Secretary-Treasurer*, LYMAN CARRIER, of the Bureau of Plant Industry; *Members of Executive Committee*, R. W. KELSEY, of Haverford, Pennsylvania, and O. C. STINE, of the Office of Farm Management.

The Chemical Society of Washington (the local section of the American Chemical Society) held its summer excursion on August 15, going by boat to the smokeless powder plant and the naval proving grounds at Indian Head, Maryland.

The Division of Birds of the National Museum has recently acquired by exchange from the American Museum of Natural History 665 bird skins from Colombia, forming a part of the material upon which Dr. F. M. CHAPMAN based his "Distribution of Bird-life in Colombia," published in 1917.

Dr. C. G. ABBOT, of the Smithsonian Institution, returned from his expedition to South America on July 30.

Dr. D. G. BYERS, of the University of Washington, Seattle, recently a captain in the Chemical Warfare Service in Washington, has been appointed chief of the division of chemistry of the Bureau of Soils.

The Division of Plants of the National Museum has received a collection of about 1300 specimens from Colorado and New England, presented by Dr. S. F. BLAKE, of the Bureau of Plant Industry.

Dr. F. G. COTTRELL has been appointed assistant director of the Bureau of Mines, in charge of the newly organized investigations

branch. The operations branch has been placed in charge of Mr. F. J. BAILEY, formerly chief clerk of the Bureau.

Dr. ABRAHAM JACOBI, a non-resident member of the ACADEMY, died at his summer home at Bolton Landing, New York, on July 10, 1919, in his ninetieth year. Dr. Jacobi was born at Hartum, Westfalen, Germany, on May 6, 1830. He came to the United States in 1853, as a result of his participation in the revolution of 1848. His sixty-six years of active medical work in New York City, during which he lectured and taught in several of the medical colleges of that city and contributed voluminously to medical literature, earned him the title of "the father and founder of American pediatrics." He had been a member of the ACADEMY since 1899.

Dr. J. A. LE CLERC resigned on August 31 from the Bureau of Chemistry, U. S. Department of Agriculture, and is now with the Miner-Hillard Milling Company of Wilkes-Barre, Pennsylvania.

Mr. J. J. SKINNER, of the Bureau of Plant Industry, has been awarded the Edward Longstreth Medal of Merit by the Franklin Institute of Philadelphia, for his paper on "Soil Aldehydes."

Dr. J. E. SPURR has resigned from the Bureau of Mines, to become editor of the *Engineering and Mining Journal* of New York.

Dr. JOSEPH B. UMPLEBY has resigned from the U. S. Geological Survey to accept the position of Director of the School of Engineering Geology of the University of Oklahoma, at Norman, Oklahoma.

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